

April 7, 1881

THE PRESIDENT in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

- I. “On the Minute Structure of the Lung of the Newt with especial reference to its Nervous Apparatus.” By WILLIAM STIRLING, M.D., Sc.D., Regius Professor of the Institutes of Medicine (Physiology) in the University of Aberdeen. Communicated by Professor HUXLEY, Sec. R.S. Received March 19, 1881.

(Abstract.)

The lungs of the newt and triton are essentially simple sacs without any septa projecting into their interior, so that they are remarkably well suited for microscopic examination. They are covered externally by a layer of endothelium, but there are no stomata to be found between the endothelial cells. Under this is a small quantity of areolar tissue containing a plexus of yellow elastic fibres, with the long axis of the meshes arranged in the long axis of the lung-sac. Under this is a layer of non-striped muscular fibres, which forms a complete investment for the lung. These muscular fibres are disposed circularly. They present the same structure as similar cells in the mesentery of the newt. Each cell contains an intra-nuclear and intracellular plexus of fibrils.

The arrangement and distribution of the blood-vessels is then described. The pulmonary artery runs along one side of the lung and the pulmonary vein runs on the opposite side. The trunk of the pulmonary vein lies quite superficially, *i.e.*, next the peritoneal surface. It is covered only by the serous investment of the lung, so that it lies superficial to, *i.e.*, outside, the muscular layer. The pulmonary artery lies deeper, below the muscular coat. The capillaries are then described. No capillaries exist internal to the line of distribution of the pulmonary vein, but capillaries are found over, *i.e.*, internal to, the line of distribution of the pulmonary artery. The epithelium is then described. Ciliated epithelium is found along the course of the pulmonary vein and at the origin of its chief branches, but the other parts of the lung are covered by a single layer of squamous epithe-

lium. The ciliated epithelium is directly continuous with that lining the short trachea.

The *nerves* of the lung are very numerous and are branches of the vagus. They enter the lung in three or four main strands at its base. These strands are of unequal thickness, *i.e.*, a varying number of nerve-fibres enters into their composition. At once they proceed towards the pulmonary *vein*, which they follow very closely in their distribution. They form a plexus along the course of the vein, which is readily revealed with the aid of gold chloride. Only a few non-medullated nerve-fibres pass on to the pulmonary artery. The nerve-strands lie outside the muscular coat, and as they pass onwards in the pulmonary walls they give off branches right and left. A large number of multipolar nerve-cells exists in the course of the nerve-strands, and they are especially numerous where a branch is given off. More than twenty medullated nerve-fibres and a considerably larger number of non-medullated fibres enter the lung. The nerve-strands in their course along the pulmonary vein lie in spaces lined by squamous epithelium.

The branches of the nerve-strands lie outside the muscular coat. The axial cylinders split up into fibrils, many of which divide dichotomously, and afterwards unite to form a wide meshed *primary nerve plexus* external to the muscular coat. From this branches are given off which form a much finer *secondary plexus*, which gives off very fine branches which run towards the muscular fibres in which they seem to terminate. It cannot, however, be maintained that all the nerve-fibres which enter the lung terminate in the muscular coat. The majority of the non-medullated nerve-fibres distributed along the course of the pulmonary artery seem destined for the muscular tissue in its walls. The author has found a plexus of nerve-fibres in the adventitia and another in the muscular coat of the pulmonary artery. Some of the nerve-fibres must, undoubtedly, have other relations than those indicated above.

The author points out that, as the lungs are developed from the alimentary canal, it is to be expected that structures, the exact homologues and representatives of those occurring in the wall of the alimentary canal, may be expected to occur in the lung. He suggests therefore, that the non-striped muscle in the wall of the lung of the newt, and the tracheal and bronchial muscles in the mammalian lung, are the representatives of one or more of the muscular tissues of the alimentary canal; and, as each of these muscular tissues has a nerve plexus in relation with it, a similar condition may be expected to occur in the lung. The plexus in the wall of the lung is comparable to Auerbach's or Meissner's plexus, or perhaps to both.